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L2: Entry 1 of 33

File: USPT

Sep 30, 2003

US-PAT-NO: 6628821

DOCUMENT-IDENTIFIER: US 6628821 B1

TITLE: Canonical correlation analysis of image/control-point location coupling for the automatic location of control points

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
Draw Desc	Image										

☐ 2. Document ID: US 6614428 B1

L2: Entry 2 of 33

File: USPT

Sep 2, 2003

US-PAT-NO: 6614428

DOCUMENT-IDENTIFIER: US 6614428 B1

TITLE: Compression of animated geometry using a hierarchical level of detail coder

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
Draw Desc	Image										

☐ 3. Document ID: US 6606095 B1

L2: Entry 3 of 33

File: USPT

Aug 12, 2003

US-PAT-NO: 6606095

DOCUMENT-IDENTIFIER: US 6606095 B1

TITLE: Compression of animated geometry using basis decomposition

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Draw Desc	Image									

☒ 4. Document ID: US 6573890 B1

L2: Entry 4 of 33

File: USPT

Jun 3, 2003

US-PAT-NO: 6573890

DOCUMENT-IDENTIFIER: US 6573890 B1

TITLE: Compression of animated geometry using geometric transform coding

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWMC
Draw Desc	Image									

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☐ 5. Document ID: US 6525735 B1

L2: Entry 5 of 33

File: USPT

Feb 25, 2003

US-PAT-NO: 6525735

DOCUMENT-IDENTIFIER: US 6525735 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: System for attaching rigid objects to deformed shapes in computer generated images via real time local approximation of deformation using rotation

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWMC
Draw Desc	Image									

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☐ 6. Document ID: US 6489960 B2

L2: Entry 6 of 33

File: USPT

Dec 3, 2002

US-PAT-NO: 6489960

DOCUMENT-IDENTIFIER: US 6489960 B2

TITLE: Hybrid subdivision in computer graphics

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWMC
Draw Desc	Image									

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☐ 7. Document ID: US 6428490 B1

L2: Entry 7 of 33

File: USPT

Aug 6, 2002

US-PAT-NO: 6428490

DOCUMENT-IDENTIFIER: US 6428490 B1

TITLE: Goniometer-based body-tracking device and method

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWMC
Draw Desc	Image									

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☐ 8. Document ID: US 6400828 B2

L2: Entry 8 of 33

File: USPT

Jun 4, 2002

US-PAT-NO: 6400828

DOCUMENT-IDENTIFIER: US 6400828 B2

TITLE: Canonical correlation analysis of image/control-point location coupling for the automatic location of control points

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

☐ 9. Document ID: US 6396495 B1

L2: Entry 9 of 33

File: USPT

May 28, 2002

US-PAT-NO: 6396495

DOCUMENT-IDENTIFIER: US 6396495 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Producing image data in a virtual set

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

☐ 10. Document ID: US 6324296 B1

L2: Entry 10 of 33

File: USPT

Nov 27, 2001

US-PAT-NO: 6324296

DOCUMENT-IDENTIFIER: US 6324296 B1

TITLE: Distributed-processing motion tracking system for tracking individually modulated light points

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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L2: Entry 11 of 33

File: USPT

Oct 9, 2001

US-PAT-NO: 6300960

DOCUMENT-IDENTIFIER: US 6300960 B1

TITLE: Realistic surface simulation in computer animation

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

[KIMC](#)☐ 12. Document ID: US 6268871 B1

L2: Entry 12 of 33

File: USPT

Jul 31, 2001

US-PAT-NO: 6268871

DOCUMENT-IDENTIFIER: US 6268871 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Generating a curve for computer graphics through points residing on underlying geometries in a three dimensional space

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

[KIMC](#)☐ 13. Document ID: US 6268865 B1

L2: Entry 13 of 33

File: USPT

Jul 31, 2001

US-PAT-NO: 6268865

DOCUMENT-IDENTIFIER: US 6268865 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and apparatus for three-dimensional painting

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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[KIMC](#)☐ 14. Document ID: US 6222553 B1

L2: Entry 14 of 33

File: USPT

Apr 24, 2001

US-PAT-NO: 6222553

DOCUMENT-IDENTIFIER: US 6222553 B1

TITLE: Hybrid subdivision in computer graphics

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

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☐ 15. Document ID: US 6188776 B1

L2: Entry 15 of 33

File: USPT

Feb 13, 2001

US-PAT-NO: 6188776

DOCUMENT-IDENTIFIER: US 6188776 B1

TITLE: Principle component analysis of images for the automatic location of control points

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

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☐ 16. Document ID: US 6163319 A

L2: Entry 16 of 33

File: USPT

Dec 19, 2000

US-PAT-NO: 6163319

DOCUMENT-IDENTIFIER: US 6163319 A

TITLE: Method, system, and computer program product for shading

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KMC

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☐ 17. Document ID: US 6144773 A

L2: Entry 17 of 33

File: USPT

Nov 7, 2000

US-PAT-NO: 6144773

DOCUMENT-IDENTIFIER: US 6144773 A

TITLE: Wavelet-based data compression

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KMC

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☐ 18. Document ID: US 6131071 A

L2: Entry 18 of 33

File: USPT

Oct 10, 2000

US-PAT-NO: 6131071

DOCUMENT-IDENTIFIER: US 6131071 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Spectral decomposition for seismic interpretation

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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K/MC

☐ 19. Document ID: US 6130676 A

L2: Entry 19 of 33

File: USPT

Oct 10, 2000

US-PAT-NO: 6130676

DOCUMENT-IDENTIFIER: US 6130676 A

TITLE: Image composition system and process using layers

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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K/MC

☒ 20. Document ID: US 6072496 A

L2: Entry 20 of 33

File: USPT

Jun 6, 2000

US-PAT-NO: 6072496

DOCUMENT-IDENTIFIER: US 6072496 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and system for capturing and representing 3D geometry, color and shading of facial expressions and other animated objects

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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K/MC

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L2: Entry 21 of 33

File: USPT

Apr 18, 2000

US-PAT-NO: 6050962

DOCUMENT-IDENTIFIER: US 6050962 A

TITLE: Goniometer-based body-tracking device and method

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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[KIMC](#)☐ 22. Document ID: US 6037949 A

L2: Entry 22 of 33

File: USPT

Mar 14, 2000

US-PAT-NO: 6037949

DOCUMENT-IDENTIFIER: US 6037949 A

TITLE: Texture mapping and other uses of scalar fields on subdivision surfaces in computer graphics and animation

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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[KIMC](#)☐ 23. Document ID: US 5949424 A

L2: Entry 23 of 33

File: USPT

Sep 7, 1999

US-PAT-NO: 5949424

DOCUMENT-IDENTIFIER: US 5949424 A

TITLE: Method, system, and computer program product for bump mapping in tangent space

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

[KIMC](#)☐ 24. Document ID: US 5915250 A

L2: Entry 24 of 33

File: USPT

Jun 22, 1999

US-PAT-NO: 5915250

DOCUMENT-IDENTIFIER: US 5915250 A



**\*\* See image for Certificate of Correction \*\***

TITLE: Threshold-based comparison

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMOC
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☐ 25. Document ID: US 5913205 A

L2: Entry 25 of 33

File: USPT

Jun 15, 1999

US-PAT-NO: 5913205

DOCUMENT-IDENTIFIER: US 5913205 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Query optimization for visual information retrieval system

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMOC
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☐ 26. Document ID: US 5911139 A

L2: Entry 26 of 33

File: USPT

Jun 8, 1999

US-PAT-NO: 5911139

DOCUMENT-IDENTIFIER: US 5911139 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Visual image database search engine which allows for different schema

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMOC
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☐ 27. Document ID: US 5909380 A

L2: Entry 27 of 33

File: USPT

Jun 1, 1999

US-PAT-NO: 5909380

DOCUMENT-IDENTIFIER: US 5909380 A

TITLE: Device and method for simulating an examination or a surgical operation performed on a simulated organ

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMOC
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☐ 28. Document ID: US 5893095 A

L2: Entry 28 of 33

File: USPT

Apr 6, 1999

US-PAT-NO: 5893095

DOCUMENT-IDENTIFIER: US 5893095 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Similarity engine for content-based retrieval of images

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KMC

☐ 29. Document ID: US 5880736 A

L2: Entry 29 of 33

File: USPT

Mar 9, 1999

US-PAT-NO: 5880736

DOCUMENT-IDENTIFIER: US 5880736 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Method system and computer program product for shading

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KMC

☐ 30. Document ID: US 5870691 A

L2: Entry 30 of 33

File: USPT

Feb 9, 1999

US-PAT-NO: 5870691

DOCUMENT-IDENTIFIER: US 5870691 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Spectral decomposition for seismic interpretation

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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L2: Entry 31 of 33

File: USPT

Nov 10, 1998

US-PAT-NO: 5835693

DOCUMENT-IDENTIFIER: US 5835693 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Interactive system for simulation and display of multi-body systems in three dimensions

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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[KMIC](#)☐ 32. Document ID: US 5710876 A

L2: Entry 32 of 33

File: USPT

Jan 20, 1998

US-PAT-NO: 5710876

DOCUMENT-IDENTIFIER: US 5710876 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Computer graphics system for rendering images using full spectral illumination data

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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[KMIC](#)☐ 33. Document ID: US 5510838 A

L2: Entry 33 of 33

File: USPT

Apr 23, 1996

US-PAT-NO: 5510838

DOCUMENT-IDENTIFIER: US 5510838 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Apparatus and method for picture representation by data compression

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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**WEST**[Generate Collection](#)[Print](#)**Search Results - Record(s) 1 through 3 of 3 returned.**☐ 1. Document ID: US 6573890 B1

L5: Entry 1 of 3

File: USPT

Jun 3, 2003

DOCUMENT-IDENTIFIER: US 6573890 B1

TITLE: Compression of animated geometry using geometric transform coding

US Patent No. (1):  
6573890Detailed Description Text (22):

This transformation maximally decorrelates the data and produces an orthonormal basis. However, the KL approach cannot capture non-linear transformations of the data. Imagine a rigid shape spinning around the z-axis while translating in x. There is no set of basis shapes that can be combined to capture this simple rotation plus translation.

Detailed Description Text (87):

Another method for compressing a matrix representing time-dependent geometry is to decompose the matrix into basis functions and weights using principal component analysis. Techniques for finding the best set of basis vectors for a matrix go by many names: PCA (principal components analysis), KL-transform (Karhunen-Loeve), SVD (singular value decomposition.), etc. The SVD factors the vertex matrix  $V$  into  $UDW$ , where  $U$  and  $W$  are orthonormal matrices, and  $D = \text{diag}(s_{\text{sub}.0}, s_{\text{sub}.1}, s_{\text{sub}.2}, \dots)$  is a diagonal matrix of singular values sorted by size. The size of the singular value indicates the importance of the corresponding basis vector. A basis vector is given by a singular value,  $s_{\text{sub}.i}$ , and a row  $W_{\text{sub}.i}$ . Each column  $U_{\text{sup}.i}$  gives the corresponding weights per frame. The following expression illustrates the decomposition of a matrix of vertex positions into a mesh of basis vectors and weights: ##EQU15##

Detailed Description Text (183):

The  $u$  that maximizes Equation 3 is the eigenvector associated with the largest eigenvalue of  $A A_{\text{sup}.T}$ , which is also the value of the maximum. Succeeding principal components are defined similarly, except that they are orthogonal to all preceding principal components, i.e.,  $u_{\text{sub}.i.\text{sup}.T} u_{\text{sub}.j} = 0$  for  $j \neq i$ . The principal components form an orthonormal basis set represented by the matrix  $U$  where the columns of  $U$  are the principal components of  $A$  ordered by eigenvalue size with the most significant principal component in the first column of  $U$ .

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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RWD

☐ 2. Document ID: US 6300960 B1

L5: Entry 2 of 3

File: USPT

Oct 9, 2001

DOCUMENT-IDENTIFIER: US 6300960 B1  
TITLE: Realistic surface simulation in computer animation

US Patent No. (1):  
6300960

Detailed Description Text (37):

If one chooses a basis for the left eigenvectors of  $M_{sub.n}$ ,  $L_{sub.1}$ , . . .  $L_{sub.m}$  so that they form an orthonormal set with their right counterparts, i.e.,  $L_{sub.j} \cdot E_{sub.k} = \delta_{sub.jk}$ , this projection is given by the dot product  $L_{sub.1} \cdot V$  where  $L_{sub.1}$  is the left eigenvector of  $M_{sub.n}$  with eigenvalue 1 and  $V$  is the column vector defined above of points in the neighborhood of  $S$ . For Catmull-Clark subdivision, the value of the this dot product and thus the position of the point  $s$  after infinite subdivision is given by ##EQU5##

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KIMC

☐ 3. Document ID: US 6072496 A

L5: Entry 3 of 3

File: USPT

Jun 6, 2000

DOCUMENT-IDENTIFIER: US 6072496 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and system for capturing and representing 3D geometry, color and shading of facial expressions and other animated objects

US Patent No. (1):  
6072496

Detailed Description Text (126):

If we represent our dataset as a matrix  $A$ , where frame  $i$  of the data maps column  $i$  of  $A$ , then the first principal component of  $A$  is ##EQU8## The  $u$  that maximizes the above-equation is the eigenvector associated with the largest eigenvalue of  $A \cdot A^T$  which is also the value of the maximum. Succeeding principal components are defined similarly, except that they are orthogonal to all preceding principal components, i.e.,  $u_{sub.i} \cdot A^T \cdot u_{sub.j} = 0$  for  $j \neq i$ . The principal components form an orthonormal basis set represented by the matrix  $U$  where the columns of  $U$  are the principal components of  $A$  ordered by eigenvalue size with the most significant principal component in the first column of  $U$ .

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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